

CLAIMS

1.

A semiconductor element characterized by comprising a γ - Al_2O_3 single crystal film epitaxially grown on a semiconductor single crystal substrate and an epitaxial single crystal Pt thin film disposed on the γ - Al_2O_3 single crystal film.

2.

A semiconductor element characterized by comprising a γ - Al_2O_3 single crystal film epitaxially grown on a semiconductor single crystal substrate and an epitaxial single crystal Pt thin film disposed on the γ - Al_2O_3 single crystal film, as well as a highly oriented ferroelectric thin film sequentially deposited on the single crystal Pt thin film.

3.

The semiconductor element according to Claim 1 or Claim 2, characterized in that a Si single crystal substrate is used as the semiconductor single crystal substrate.

4.

The semiconductor element according to Claim 3, characterized in that the surface of the Si single crystal substrate is a (100) face.

5.

The semiconductor element according to any one of

Claims 2, 3, and 4, characterized in that a thin film made of any one of BaMgF_4 , $\text{Bi}_4\text{Ti}_3\text{O}_{12}$, $(\text{Bi},\text{La})_4\text{Ti}_3\text{O}_{12}$, BaTiO_3 , $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$, $\text{SrBi}_2\text{Ta}_2\text{O}_9$, PbTiO_3 , $\text{Pb}_y\text{La}_{1-y}\text{Zr}_x\text{Ti}_{1-x}\text{O}_3$, and ZnO is used as the ferroelectric thin film.

6.

A semiconductor sensor characterized by comprising a γ - Al_2O_3 single crystal film epitaxially grown on a semiconductor single crystal substrate, an epitaxial single crystal Pt thin film disposed on the γ - Al_2O_3 single crystal film, and a highly oriented ferroelectric thin film disposed on the single crystal Pt thin film, as well as an upper electrode disposed on the ferroelectric thin film.

7.

The semiconductor sensor according to Claim 6, characterized in that the semiconductor single crystal substrate has an SOI structure.

8.

The semiconductor sensor according to Claim 6, characterized in that the semiconductor single crystal substrate is subjected to a treatment for adjusting a resonant frequency and an ultrasonic wave is detected.

9.

The semiconductor sensor according to Claim 6, characterized in that the semiconductor single crystal substrate is subjected to etching for isolation of heat and

an infrared ray is detected.

10.

The semiconductor sensor according to Claim 9, characterized in that a transistor is integrated in between the upper electrode and a lower electrode comprising the epitaxial single crystal Pt thin film.

11.

A semiconductor memory element characterized by comprising a memory feature in which the semiconductor single crystal substrate of the semiconductor element according to any one of Claims 1 to 5 has an FET structure.